



CHEMICAL BRUSH CONTROL

A high percentage of the rural overhead power lines in the United States are located where trees or shrubs of some sort grow without any encouragement from man. These lines were constructed after the right-of-way had been cleared and in most cases have been recleared as a routine right-of-way maintenance operation. Right-of-way clearing is necessary to make the lines accessible for patrol and repair, to assure continuity of service by keeping the trees from making contact with the conductors and to maintain a more attractive appearance. Where ice storms cause considerable line damage, the absence of trees on the right-of-way is definitely an advantage.

Brush control is the most important maintenance item for a large number of REA cooperatives. Naturally it is a more urgent one for the older cooperatives, whose lines have had considerable regrowth after clearing for construction. An Ohio manager tells us that, next to the purchase of power for his cooperative, right-of-way maintenance represents the most significant item of expense.

HISTORY

For centuries cutting has been done with hand tools or with machinery, the latter so varied in nature that even now we hear of new devices for this purpose. Burning of undergrowth has also been done to a limited extent and often in conjunction with cutting. Only recently has the use of chemicals been feasible, where woody growth was concerned. Chemical control of herbaceous growth has been done for a slightly longer time. Actually the first work with the 2,4-D materials began during World War II when growth regulating materials were being investigated. It was found that a little of this material acted as a plant stimulant to encourage growth, but that more was injurious and in large enough doses would kill plants. The first use of 2,4-D to kill brush was about 1946. By itself it was effective on some of the species, but not on enough of them in many cases. In 1949 a related chemical 2,4,5-T came into limited use and was found to be injurious to species not killed by 2,4-D. A combination of 2,4-D and 2,4,5-T is usually the most desirable where there is a variety of woody growth. Another modern brush killer is Ammate or ammonium sulfamate.

In 1948 twelve cooperatives provided us with details of their experience with chemical brush control. Returns on the REA questionnaire on this subject, sent out last fall, indicate that more than 30 percent of all REA-financed systems are now using some form of chemical brush control.

APPLICATION METHODS

Application of herbicides to brush foliage is usually with a power sprayer at a rate of from 100 to 300 gallons per acre. Some applications have been made by airplane. Spraying on the ground is usually with a water solution;

the airplane method is with 2,4-D and 2,4,5-T esters in oil at a rate of about five gallons per acre.

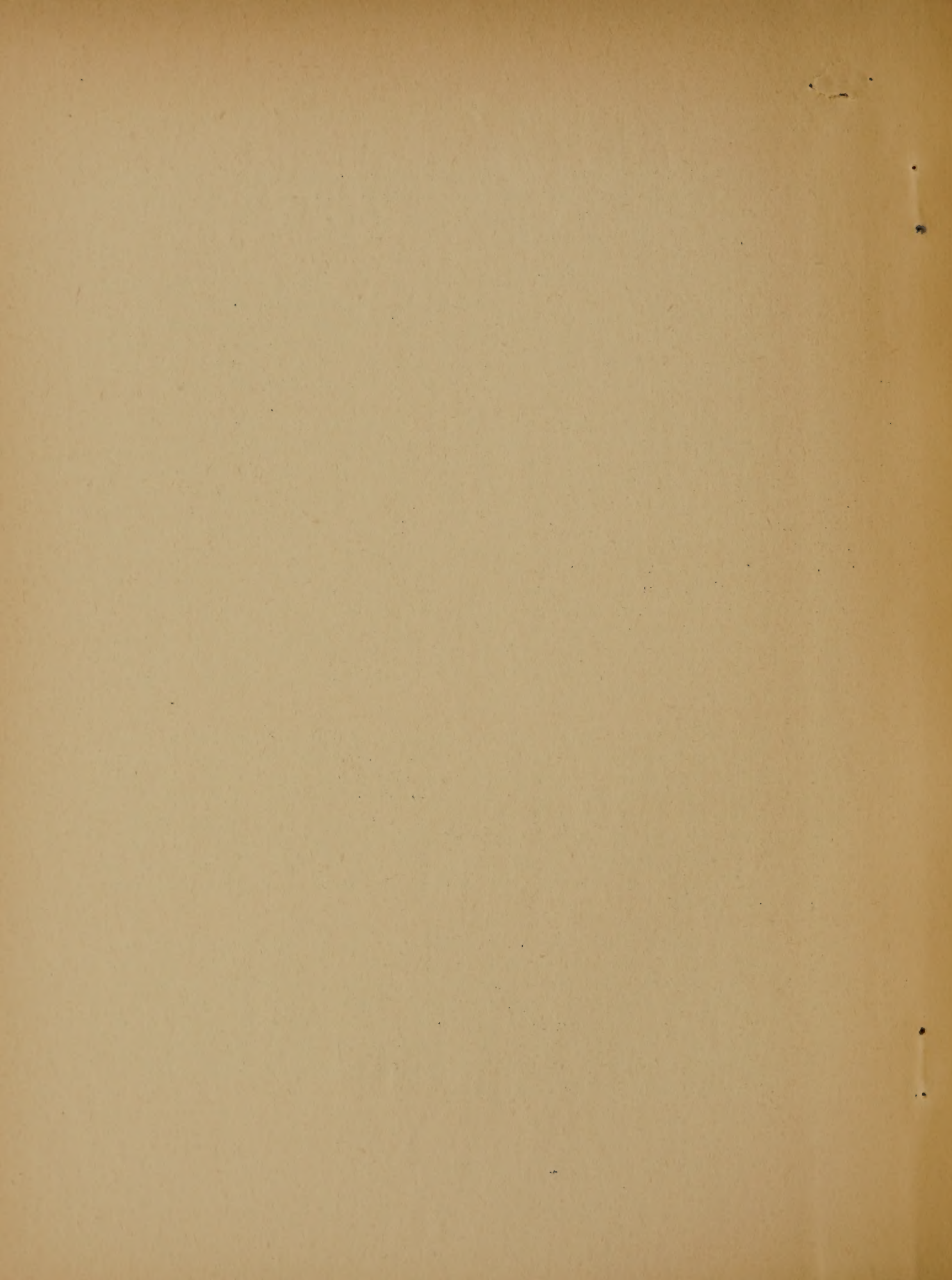
Foliage applications must be done during the growing season. The basal treatment is coming into more use and consists of spraying the lower part of the stems throughly to the ground line. Freshly cut stumps can be sprayed with satisfactory results.

Naturally the amount of chemical or solution for knapsack or power spraying of foliage depends to a great extent on the strength of solution, height of brush and density of brush. A typical application consists of 150 gallons per acre on growth six feet tall, three pounds of acid equivalent of 2,4-D and 2,4,5-T esters being mixed with each hundred gallons of water. This application would require $4\frac{1}{2}$ pounds of acid per acre.

Most foliage spraying is done with power equipment. If the power system has a considerable quantity of brush to be sprayed, a sprayer unit rated 15 or 20 gpm is used. This unit includes a tank, often of 200-gallon capacity pump, pressure regulator, an air or water-cooled gasoline engine, and sufficient high-pressure, oil resistant hose to reach the growth to be sprayed. The spray solution is ususly applied by a short, trigger-controlled gun on which droplet size can be adjusted for a range of sizes from fine fog to solid stream, depending on the distance of gun from growth sprayed. Another type of gun employs trigger control on the hose end of a pipe handle, at the other end of which are mounted the desired number of nozzle heads. The latter type does not permit adjustment of size of spray which is a fog. The only way the droplet size of the fog can be determined is by the size of discs used in the nozzle heads. The above described sprayer, skid-mounted, costs from \$1300 to \$1700.

Useful accesories for a power sprayer are a tank refiller which is operated by the sprayer, a reel for orderly stowage of the hose and portable hand sprayers for spots not accessible to the power spray gun. The power sprayer unit can be mounted on a standard line truck where the terrain is easily traversed. It should be mounted on a 4-wheel-drive truck where considerable natural obstacles to a motor vehicle are present; in some instances a winch, mounted on the front end of the truck and operated by the power take-off, is desirable to assist the truck over swampy ground or up steep grades.

Smaller power units, where there is less brush to be sprayed, are of a lower gpm rating and may be mounted on a trailer or Jeep. They involve a smaller investment, yet are versatile enough to be used for basal and stump spraying as well as foliage spraying. Basal and stump spraying are more generally done with portable hand sprayers having from three to five gallons capacity. They represent an investment of about \$25 apiece and are particularly adaptable to spot spraying in localities where other right-of-way maintenance is being done.



ADVANTAGES AND LIMITATIONS

Many users of the foliage treatment for brush control claim savings of 50% in their clearing operations. Naturally the highest cost per unit cleared with chemicals occurs during the initial treatment. Since it is not usually possible to kill all the individual unwanted plants with one spraying, there is need for a second spraying the following or second year after the first spraying. A ten-year or a 20-year period should be a suitable length of time to determine the average annual cost of any method of keeping an existing right-of-way clear. The chemical method is too new for us to have gotten figures for a sufficient time to say absolutely that chemicals cost one half, two-thirds or any other fraction of cutting. Power spraying offers a quick method of getting over a lot of ground in a short time. In these days of scarce labor when wages are high this is often very important. Power spraying requires terrain where a motor vehicle can be driven. Some sprayers use as much as half a mile of hose to reach brush where local obstacles prevent driving near all right-of-way to be sprayed. Spraying is less hazardous to the men doing it than is either cutting by hand or with machinery. The brush-killing herbicides are non-poisonous to either humans or animals, when handled with reasonable care. They contain the most toxic elements thus far developed for woody plants.

Of course herbicides have limitations. The indiscriminate use of 2,4-D or 2,4,5-T has in some instances resulted in damage to sensitive crops or ornamental plants near the right-of-way sprayed. Much of this damage has been due to the spray being carried by wind from the sprayer. There is a certain amount of volatilization of the spray shortly after it has been deposited on the brush, which can result in some of the active material moving to the sensitive crop. (More damage has been done to cotton than to any other crop.) In general, the esters of 2,4-D and 2,4,5-T are classified either as volatile or low-volatile, which is an indication as to whether they respectively possess higher or lower volatility.

There are a number of controversial points relating to the use of herbicides. One is right-of-way appearance. This is a matter of concern to garden clubs, tourists and state highway commissions. Some species of brush, when killed, soon rot and fall over, to become covered with herbaceous growth within two or three years. The burned appearance of a right-of-way immediately after spraying should be looked on as temporary in many instances, and tolerable, in view of its final results. Sportsman and game commissions view with alarm the destruction of ground cover for game. This absence of ground cover should be regarded as temporary, as herbaceous plants soon grow to form a low cover. 2,4-D and 2,4,5-T do not kill the grass that may be there. If spray is applied only to the undesirable species it should be possible to create an ideal place for both game and wild flowers. This, of course, requires that the man with the sprayer be able to identify the individual plants and spray selectively. We have

heard of a few cases where it was charged that spray drifting on pasture had resulted in the death of livestock eating the forage. There are no known cases of actual herbicidal poisoning from field application of presently used herbicides marketed as non-poisonous. None of the cases of nitrate or nitrite poisoning of cattle, sheep or swine reported has been traced to herbicidal treatment of the forage eaten.

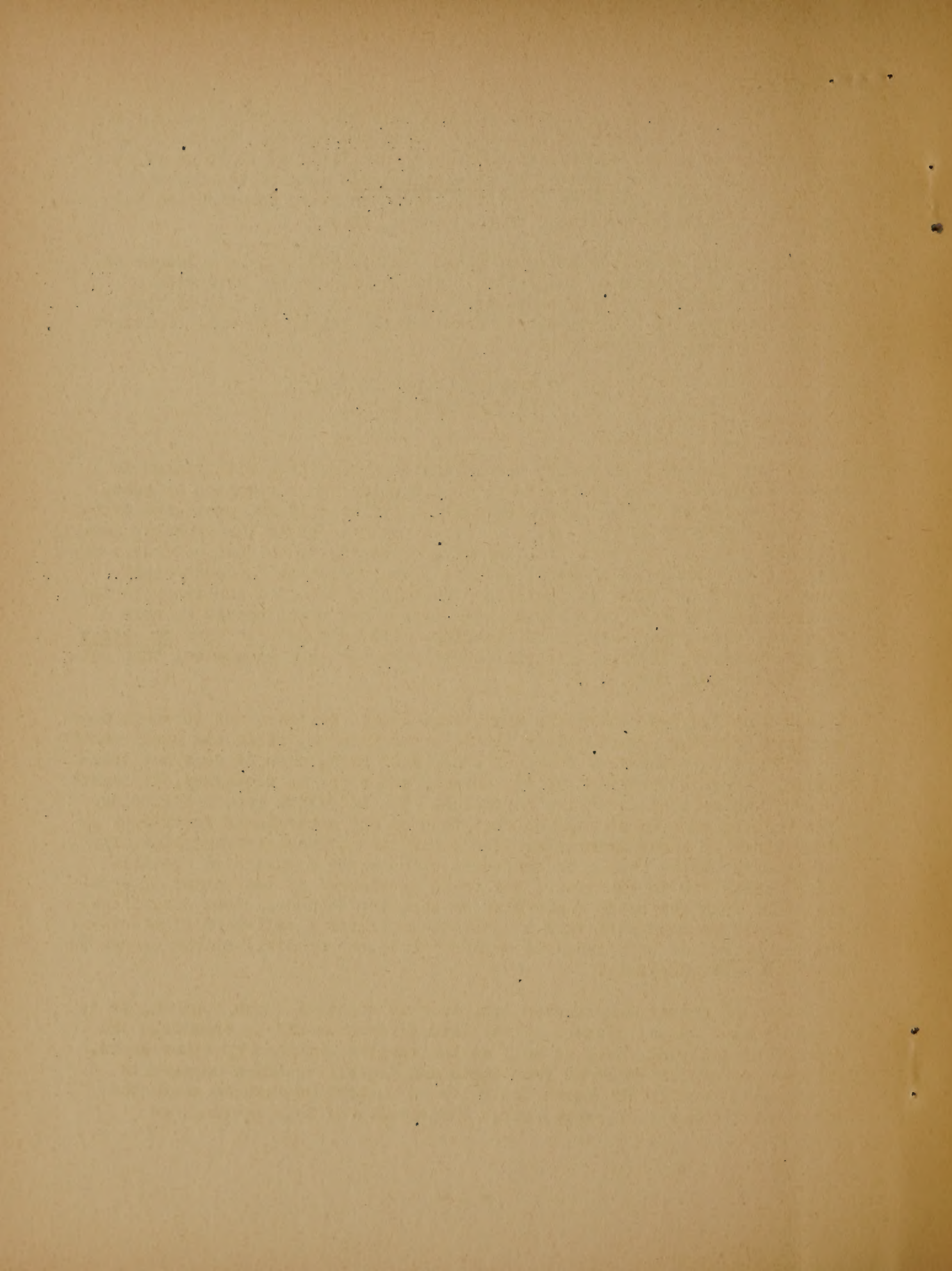
The selectivity characteristics of 2,4-D and 2,4,5-T and, to a lesser extent, of Ammate, would be desirable if it resulted in the retention of desirable shrubs on the right-of-way. However, it is more likely that this selectivity is a limitation because of the failure to kill resistant species that might be present.

USE OF CHEMICAL BRUSH CONTROL BY COOPERATIVES

In 1950 in our progress report recommendations were made with regard to making a survey of the right-of-way to determine the vegetation present, where spraying should be done with caution (if at all) and what kind of terrain would have to be gone over. A rough estimate as to the probable degree of control should be made. The amount of spraying to be done naturally determines the amount of chemical needed. Some operators contract their spraying work and leave the details of obtaining material and labor to the contractor. The cost of spraying on a long-range basis should be more favorable than other methods of clearing. Unless there are many resistant species present, chemical spraying ought to prove more economical than cutting in the long run.

If 2,4-D or 2,4,5-T esters are used, care should be taken not to spray near sensitive plants. Ammate gives little or no trouble, since the small amount of drift of this chemical does not cause much harm, also it does not volatilize. Special treatment of the sprayer and truck is necessary, if Ammate is used, to prevent excessive corrosion. The selective growth herbicides also require care in storage so that they do not contaminate fertilizer or other kinds of spray materials. The insurance company covering liability or property damage should be conferred with to get coverage on possible damage suits due to spraying. Not to be overlooked is the matter of good relations with the co-op members where spraying is done. Some educational work should be done with them to show the need for a well-kept right-of-way, the temporary bad appearance of sprayed brush and possible slight damage to nearby sensitive plants.

In a new and rather complicated job, such as chemical brush control, it is a good idea to keep informed on the latest improvements in chemicals and methods of applying them, as well as the results obtained by other users. Information may be obtained from State and Federal agencies engaged in experimental work. The North Central Weed Control Conference meets the first part of December every year. The results of this meeting are



published in proceedings and a research report. We should not overlook the manufacturers of herbicides, who often employ plant specialists, as well as chemists, who issue useful information. We have met a number of spraying contractors who have built up large businesses by spraying brush for utilities. Some tree service companies also have brush control crews engaged in killing undesirable trees.

EQUIPMENT FOR MECHANICAL CLEARING

Although not directly related to chemical control, mention should be made of the bulldozer and the Bushwacker. Several cooperatives in North Carolina are using the bulldozer economically for right-of-way clearing and are obtaining good results. Costs of \$30 to \$40 per acre compare favorably with the cost of foliage spraying of similar growth. The Bushwacker, manufactured by the American Steel Dredge Company of Fort Wayne, Indiana, has been developed especially for clearing and is different from the bulldozer in that it does not disturb the soil, cutting only the tops of all growth to the ground line and depositing it as a mulch. The Bushwacker costs from \$18,000 to \$20,000; it is doubtful if its purchase by any cooperative would be justified, since it could be used only on portions of the right-of-way of a rural power system. The use factor of a bulldozer might also be unfavorable to its purchase by any one cooperative. Also high maintenance costs are usually incurred with either the Bushwacker or the bulldozer. Some foresters are doubtful of the advisability of using either of these machines for clearing because of the nature of the growth likely to come up in the future.

Another mechanical device not directly related to chemical brush control work is the portable brush chipper for use where trimming or tree removal is required. The following companies manufacture gasoline-engine-driven chippers:

Asplundh Chipper Company, 501 York Road, Jenkinstown, Pa.
Mitts and Merrill, Saginaw, Michigan
Fitchburg Engineering Corporation, Fitchburg, Massachusetts

A few of the details of these machines are herewith tabulated.



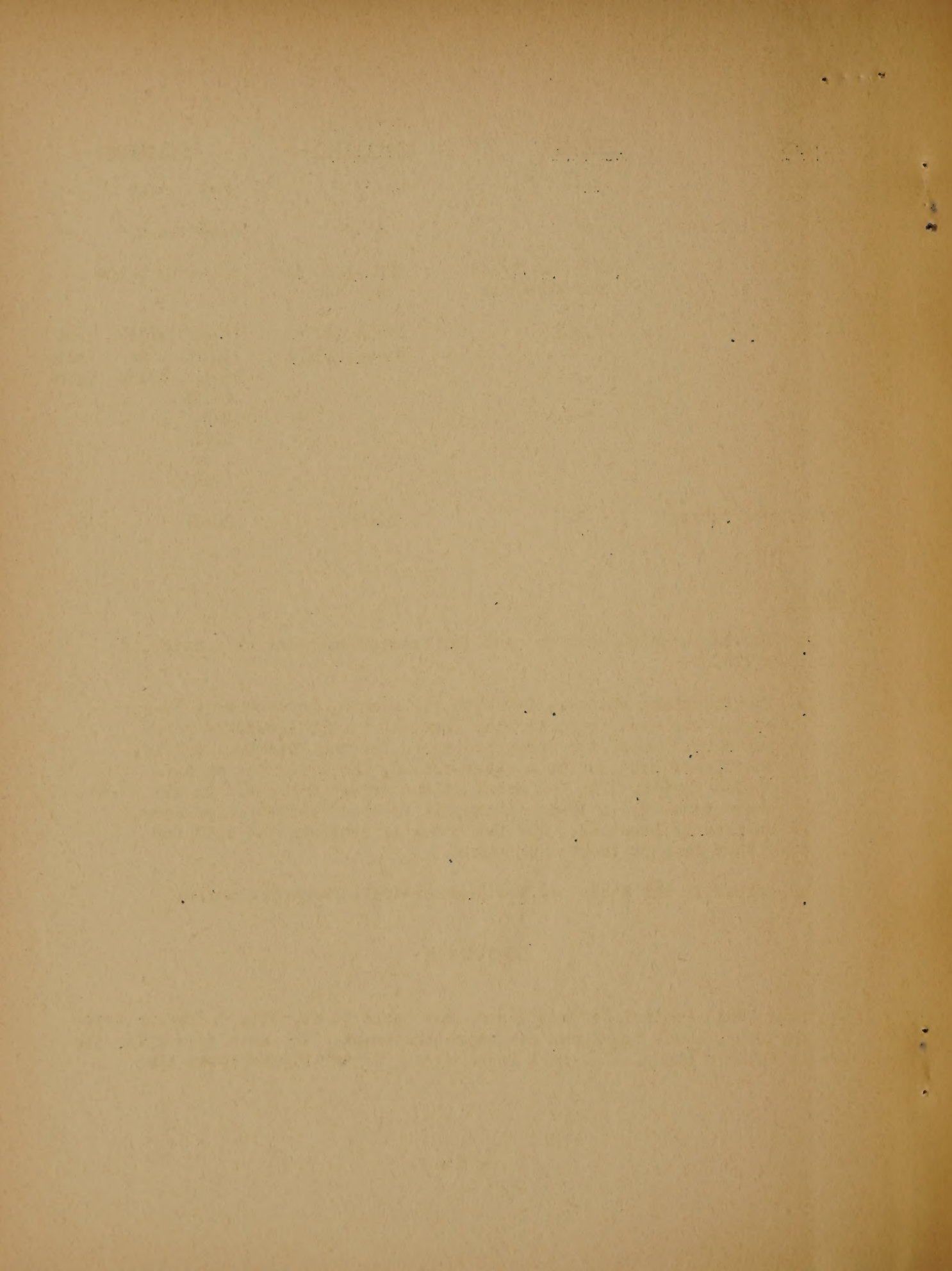
<u>Make</u>	<u>Asplundh</u>	<u>Mitts and Merrill</u>	<u>Fitchburg</u>		
Model	---	No. 3	C-9	C-6	C-5
Maximum size log	6"	6"	6-6½"	4-4½"	3"
Capacity	1.2 - 1.4 trees per man-hour	2000-3000 lb per hour	See note below		
Price F.O.B.	\$2,357	29-hp, \$2989 36-hp, \$3094	70-hp \$2330 \$4100 50-hp \$2150 \$3080 32-hp \$2820 or \$2640	or	See note below
Horsepower rating	32	25-40	30-35		20

Notes

1. The Asplundh chipper is also for tractor mounting at a price of \$1272.
2. The Fitchburg chipper, C-9 with six blades, powered by a 50-hp engine has been found to chip from one to two 128-cu-ft cords per hour. Where two costs are shown for the Fitchburg models, the higher cost is for a water-cooled, the lower for an air-cooled engine. The C-6 model at the prices indicated in the above table has a 32-hp engine; it is also available for Jeep or tractor mounting. The C-5 model is available at \$650 for either Jeep or tractor mounting.
3. Prices in the table are for 2-wheel-trailer-mounted units.

CONCLUSION

Chemical brush control has added some new tools to our kit, including foliage spraying, basal treatment and stump treatment. The main reason for its use is to save money. The goal is to have a better right-of-way than



cutting would give us. Probably foliage, basal and stump spraying will need to be combined with cutting to attain the desired results. At present 2,4-D and 2,4,5-T esters are the most used. In addition to proper method of application, other factors affect the results of spraying. These include time of year, type of soil and situation, species present, weather conditions and solution applied.

